

Claims

1. A method for magnetically recording information in a magnetic recording medium that includes a magnetic recording layer:
 - 5 placing a write head in proximity to the magnetic recording medium;
 - lowering a longitudinal coercivity in a magnetic domain in the magnetic recording layer by generating a vertical component of magnetic flux in the magnetic recording medium using the write head, the vertical component extending from the write head to a magnetically soft underlayer disposed under
 - 10 the magnetic recording layer; and
 - writing a longitudinal orientation in the magnetic domain in the magnetic recording layer by generating a horizontal component of magnetic flux in the magnetic recording layer using the write head.
- 15 2. The method of claim 1 wherein the step of lowering a longitudinal coercivity further comprises using a magnetically soft underlayer, that is located under the magnetic recording layer and separated from the magnetic recording layer by a spacer layer, to guide the magnetic flux through the magnetic recording layer at an angle having a vertical component and a horizontal
- 20 component with the vertical component being smaller than the horizontal component.
3. The method of claim 2 further comprising magnetically saturating the magnetically soft underlayer after lowering the longitudinal coercivity.
- 25 4. The method of claim 2 wherein the magnetically soft underlayer is NiFe.

5. A method for magnetically recording information in a magnetic recording medium that includes a magnetic recording layer:
placing a write head in proximity to the magnetic recording medium;
5 generating magnetic flux in the magnetic recording medium using the write head;
guiding the magnetic flux through the magnetic recording layer at an angle having a vertical component and a horizontal component with the vertical component being smaller than the horizontal component, the vertical component
10 lowering a dynamic coercivity of a selected region of the magnetic recording layer and the horizontal component writing a longitudinal orientation in the selected region.

6. The method of claim 5 wherein the step of guiding the magnetic flux
15 through the magnetic recording medium uses a magnetically soft underlayer located under the magnetic recording medium and separated from the magnetic recording medium by a spacer layer.

7. The method of claim 6 further comprising saturating the magnetically
20 soft underlayer before the horizontal component writes the longitudinal orientation in the selected region.

8. The method of claim 6 wherein the magnetically soft underlayer is NiFe.
25

9. A thin film magnetic recording medium for use with a longitudinal write head comprising:

a magnetic recording layer for longitudinal recording with an easy axis of magnetization in the plane of the layer;

5 a non-magnetic spacer layer;

a magnetically soft underlayer and

wherein a thickness of the magnetically soft underlayer and a thickness of the non-magnetic spacer layer are designed to guide magnetic flux from the longitudinal write head through the magnetic recording layer at an angle having a vertical component and a horizontal component with the horizontal component being larger than the vertical component.

10. The thin film magnetic recording medium of claim 9 wherein the magnetically soft underlayer is designed to saturate before a maximum flux from the longitudinal write head is reached.

11. The thin film magnetic recording medium of claim 9 wherein the magnetically soft underlayer further comprises first and second soft magnetic layers separated by a non-magnetic spacer layer selected to achieve the antiferromagnetic coupling between the first and second soft magnetic layers.

12. The thin film magnetic recording medium of claim 9 wherein the magnetically soft underlayer is NiFe.

13. The thin film magnetic recording medium of claim 9 wherein the magnetically soft underlayer is from 1 to 100 nm thick.

14. A disk drive system comprising:
a longitudinal write head;
means for positioning the longitudinal write head in proximity with selected locations on a disk; and
- 5 a magnetic thin film magnetic recording medium on the disk including a magnetic recording layer for longitudinal recording with an easy axis of magnetization in the plane of the layer, a non-magnetic spacer layer, a magnetically soft underlayer and wherein a thickness of the magnetically soft underlayer and a thickness of the non-magnetic spacer layer are designed to
- 10 guide magnetic flux from the longitudinal write head through the magnetic recording layer at an angle having a vertical component and a horizontal component with the horizontal component being larger than the vertical component.
- 15 15. The disk drive system of claim 14 wherein the magnetically soft underlayer saturates before a maximum flux from the longitudinal write head is reached.
- 20 16. The disk drive system of claim 14 wherein the magnetically soft underlayer further comprises first and second soft magnetic layers separated by a non-magnetic spacer layer with the first and second soft magnetic layers being antiferromagnetically coupled.
- 25 17. The disk drive system of claim 14 wherein the magnetically soft underlayer is NiFe.
- 30 18. The disk drive system of claim 14 wherein the magnetically soft underlayer is from 1 to 100 nm thick.